

Pinholes in Sensors for RunIIb Silicon Detector



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Result Summary

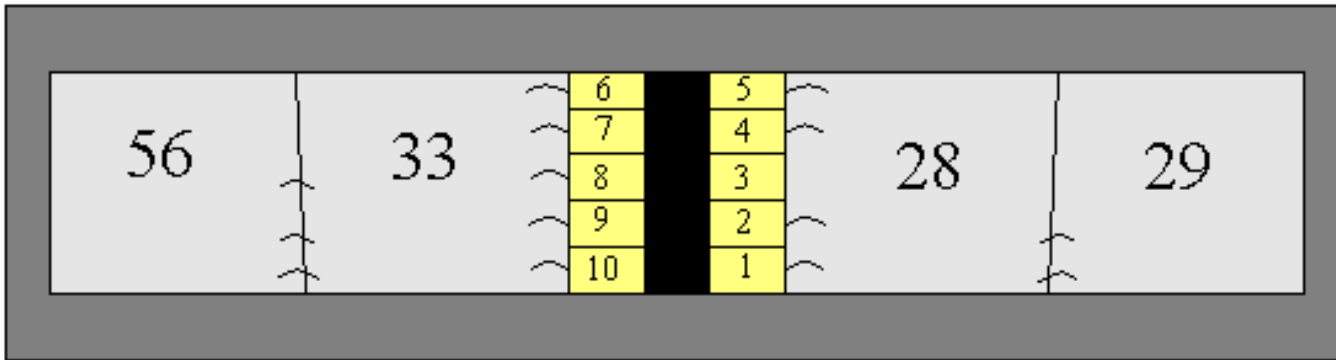
Sensor Number	Bad Channels	Chip	Comments	Module
20	0	—	Agrees with previous testing	10-10 Axial, Hybrid L2A #103
21	0	—	Agrees with previous testing	10-10 Axial, Hybrid L2A #103
28	26, possibly 111	4, 1	Not previously seen	20-20 Axial, Hybrid #8
29	Possibly 111	1	Not previously seen	20-20 Axial, Hybrid #8
33	44, 63 127	6, 6 7	44, 63 – pinholes, 127 - higher noise & pedestal	20-20 Axial, Hybrid #8
56	0	—	Not in agreement with previous tests	20-20 Axial, Hybrid #8
57	27	8	Shows low noise (not connected?)	10-10 Stereo, Hybrid #1
58	69, 2	1, 2	Show low noise (not connected?)	10-10 Stereo, Hybrid #1
59	0	—	Agrees with previous testing	10-10 Axial, Irradiated
62	28	1	Higher noise & pedestal	10-10 Axial, Irradiated



Concordance with Previous Testing

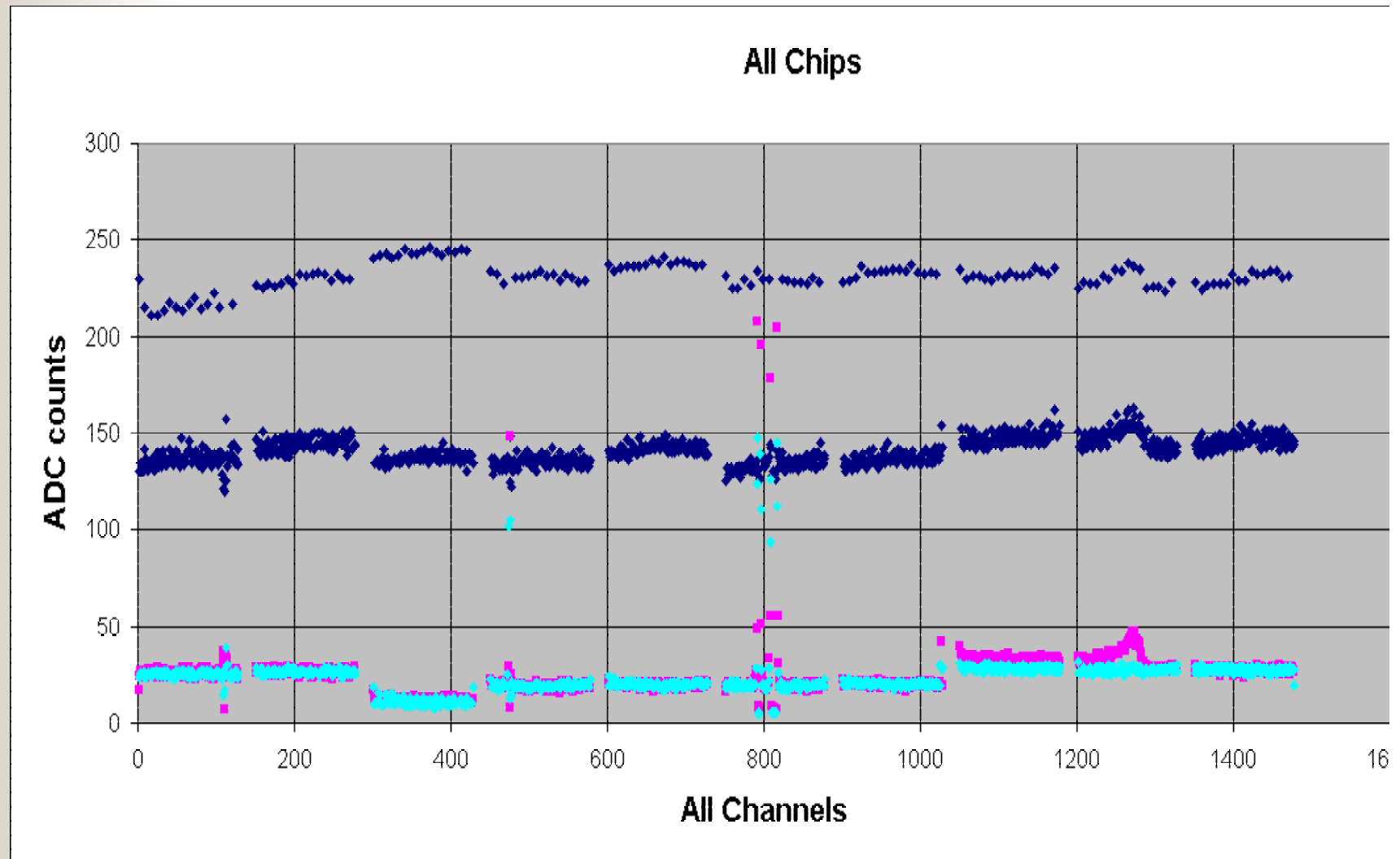
- Sensors 20 and 21
 - Module agrees with previous tests
- Sensors 28, 29, 33, and 56
 - Does not agree with previous tests
- Sensors 57 and 58
 - Module agrees with previous tests
- Sensors 59 and 62
 - Module agrees with previous tests

Sensors 28, 29, 33, and 56

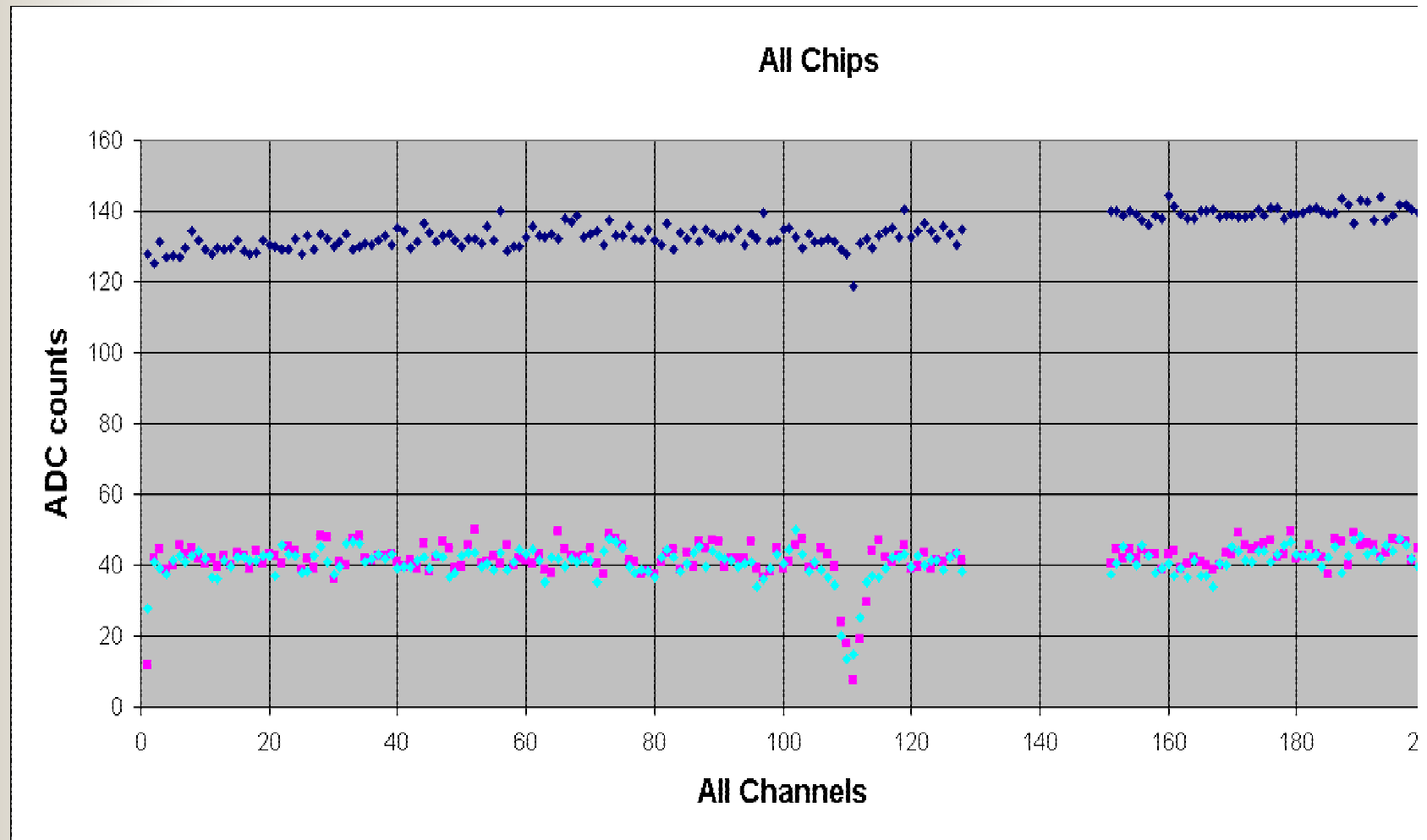


- Did not find pinholes in sensors 29 and 56
 - Not bonded to chip
- Did not find same pinhole in sensor 28
 - Pinhole at 214 not detected
 - Pinhole found in strip 26 on chip 6 and 111 on chip 1
- New pinholes discovered in sensor 33
 - No pinholes previously detected

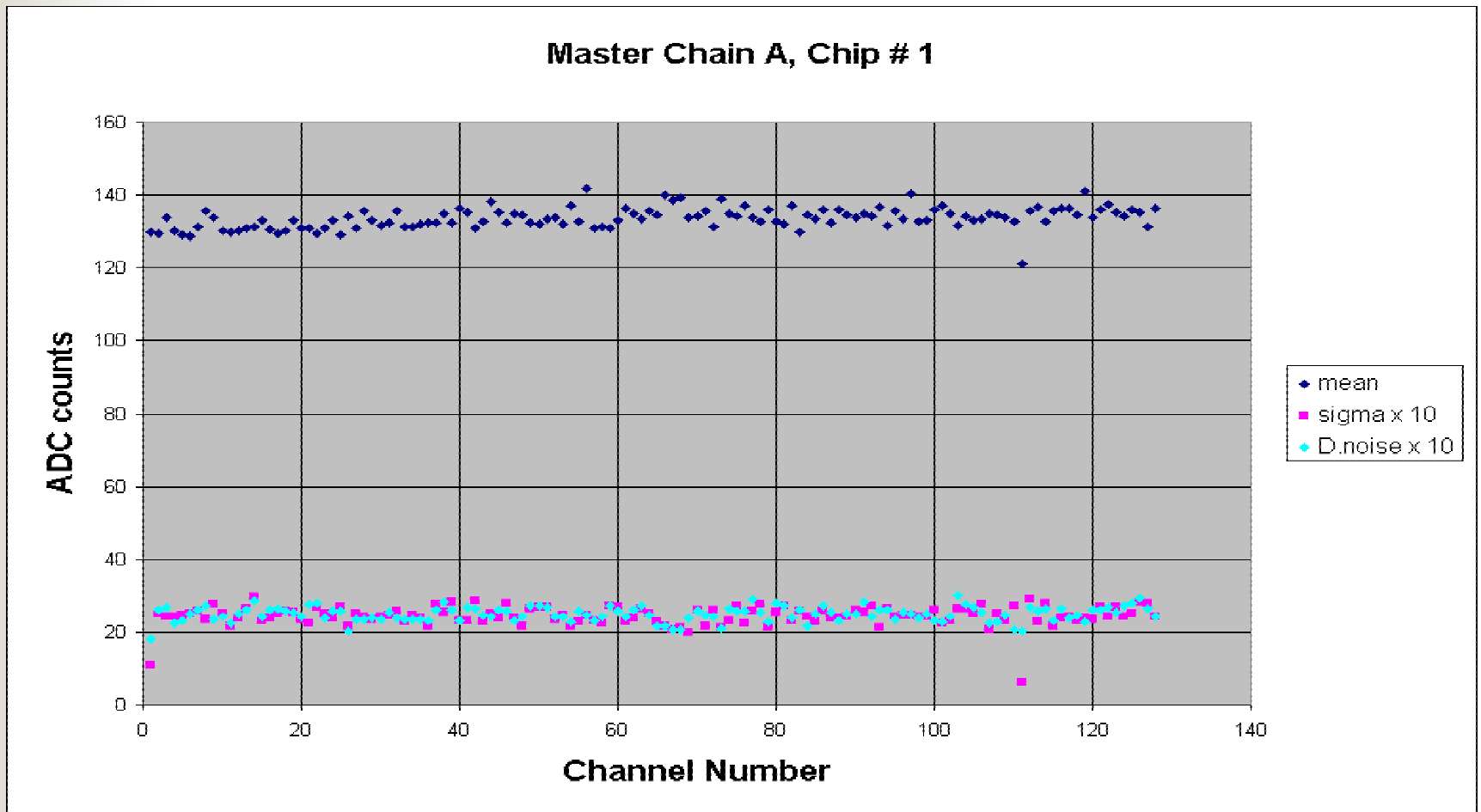
20x20 Axial Module Results



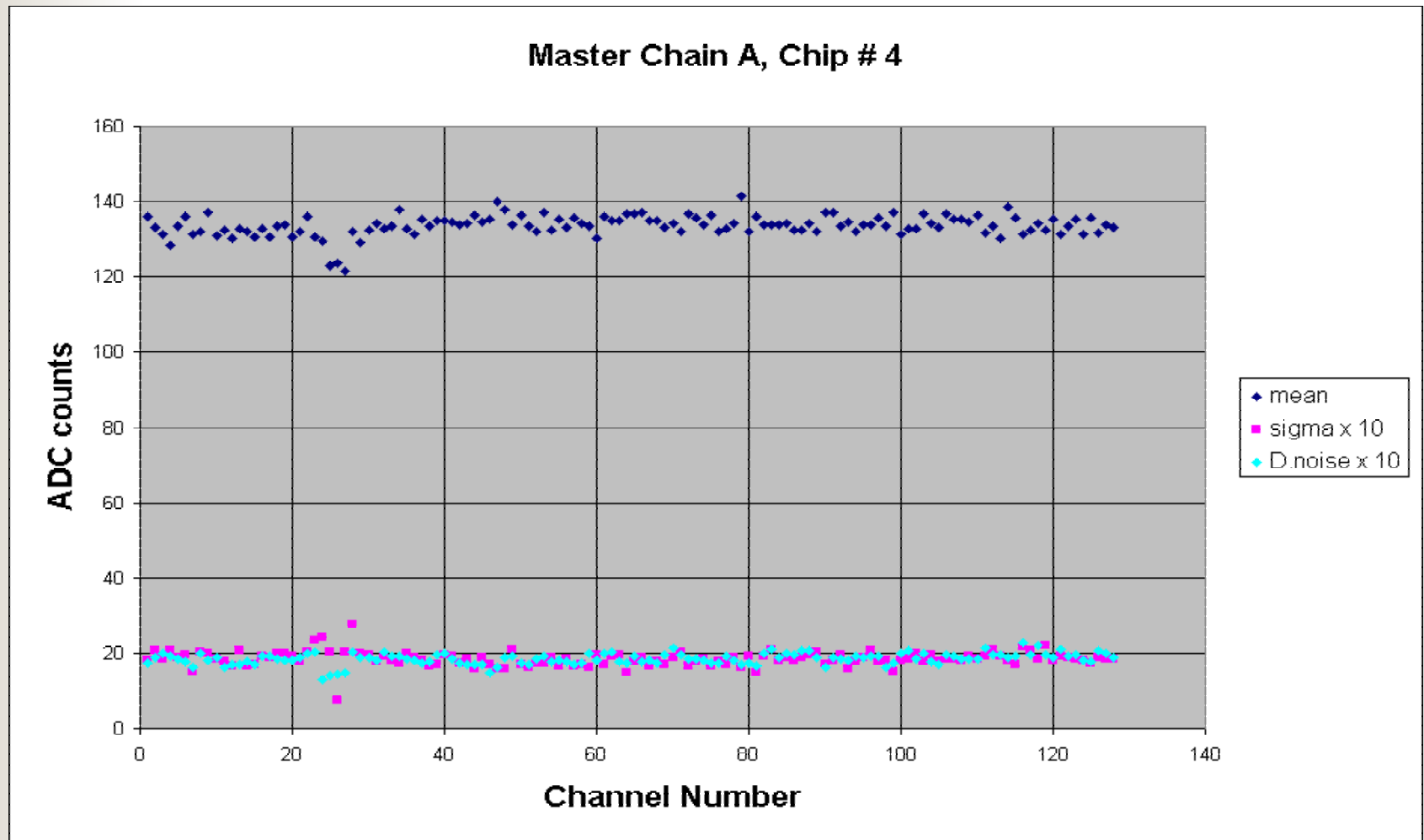
Sensor 28 Results on Chip 1 Before Masking



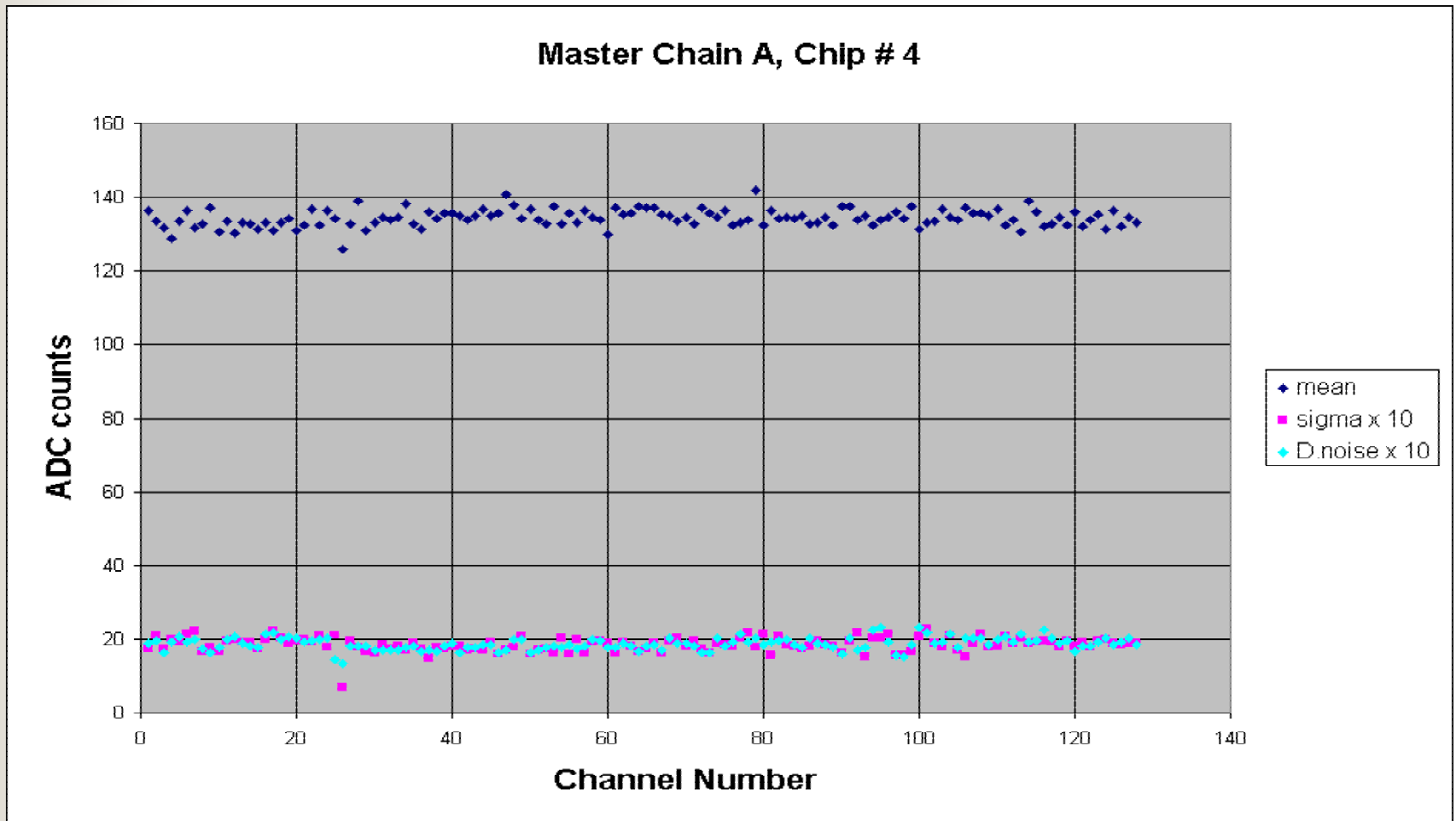
Sensor 28 Results on Chip 1 After Masking



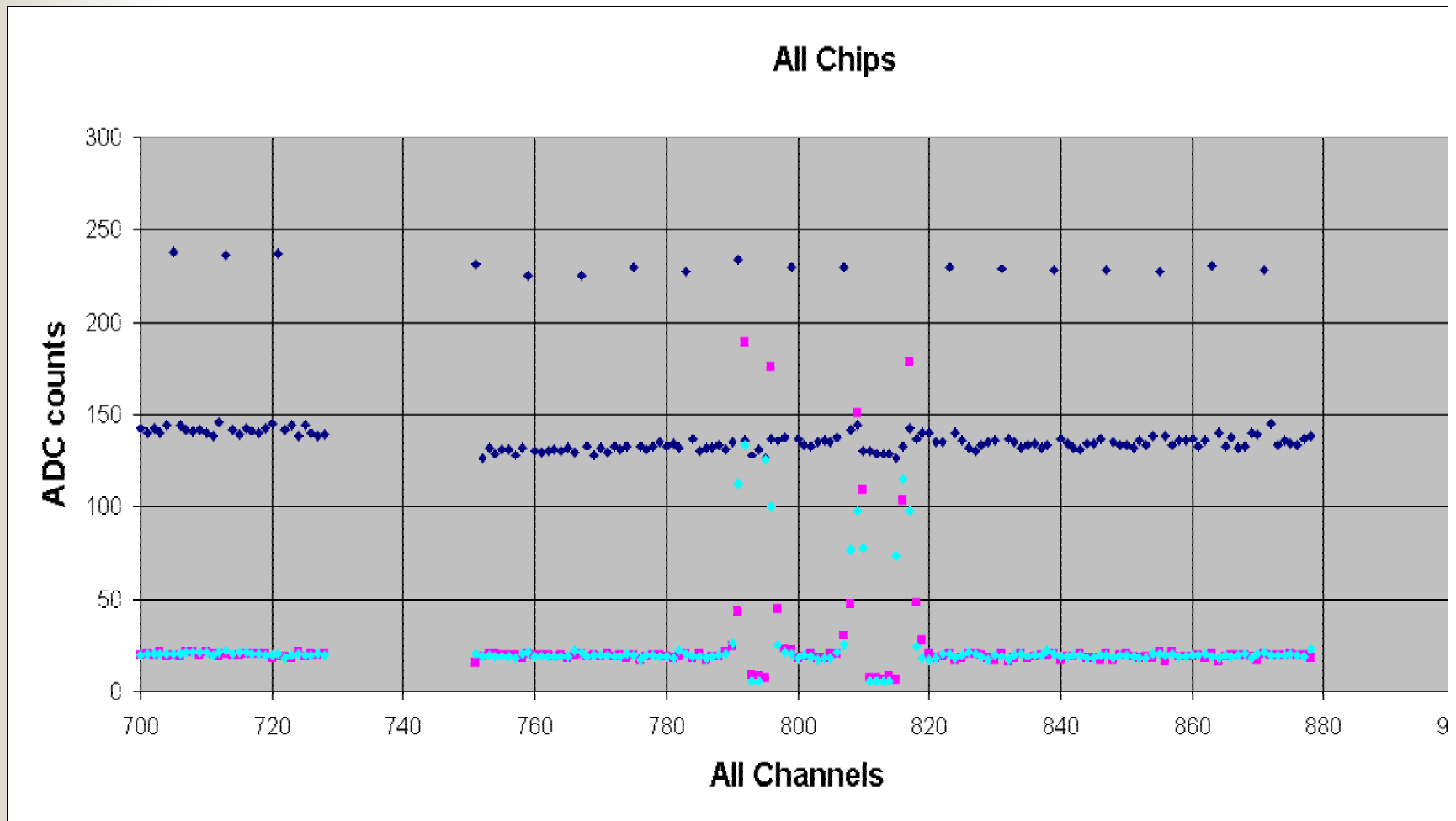
Sensor 28 Results on Chip 4 Before Masking



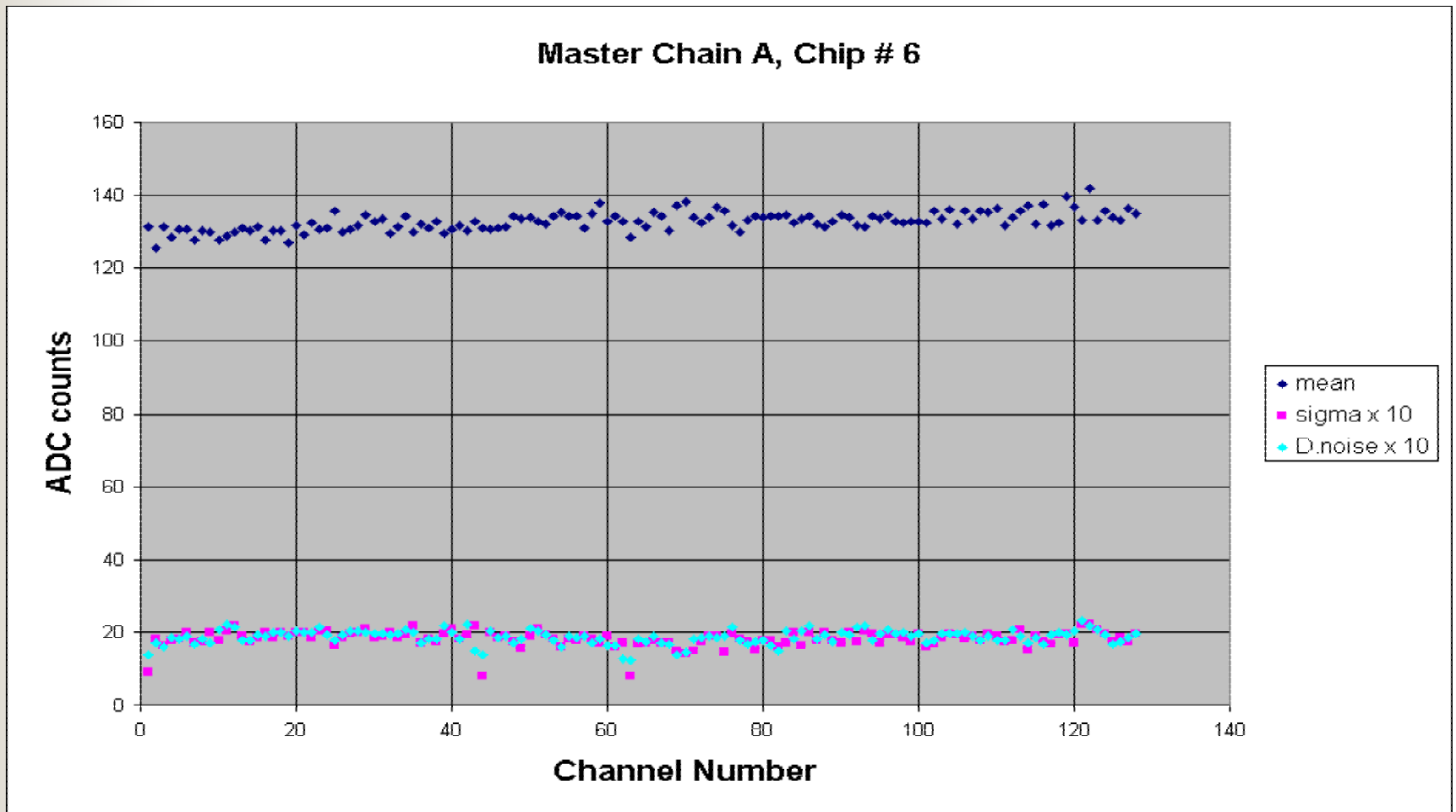
Sensor 28 Results on Chip 4 After Masking



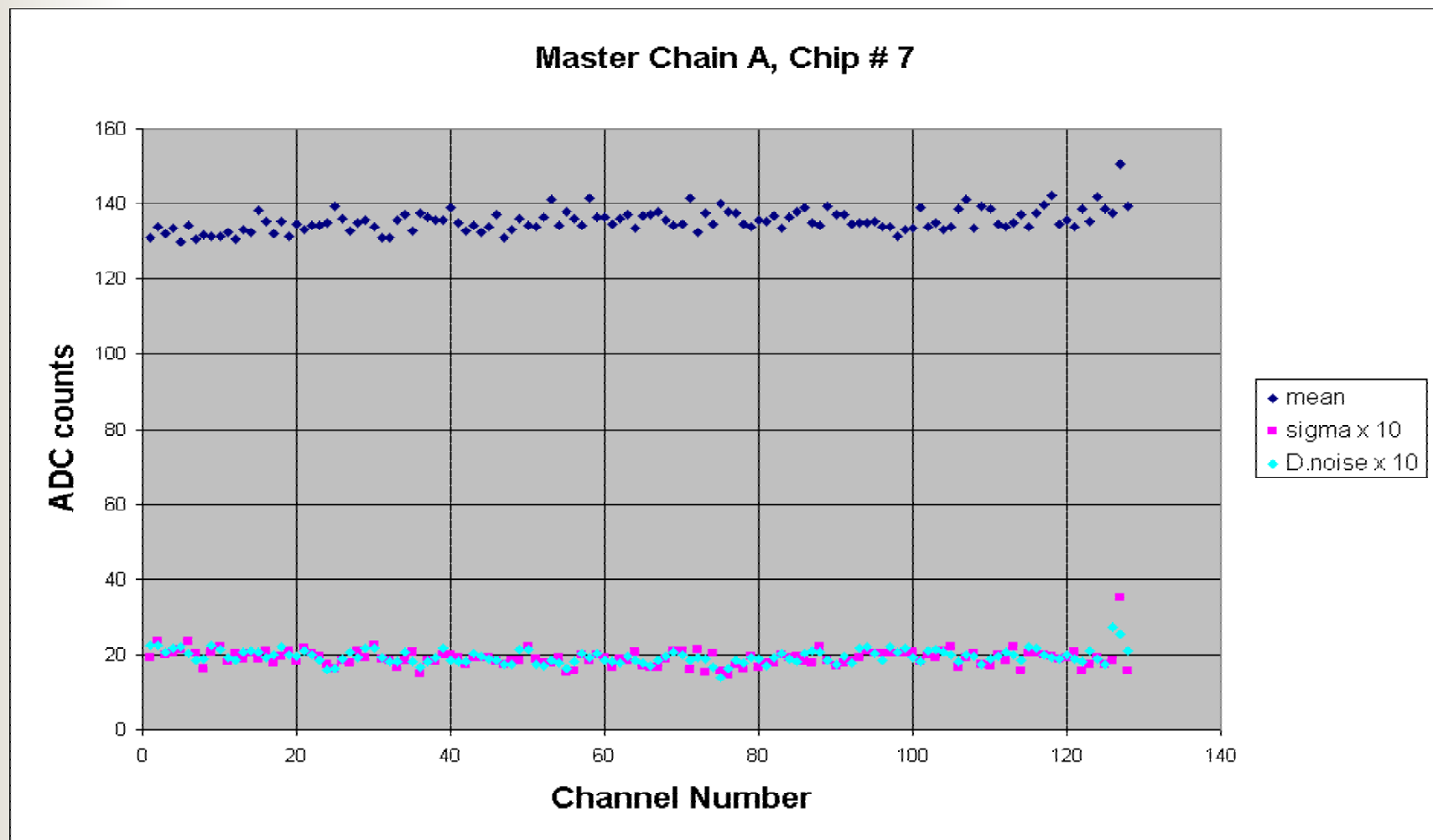
Sensor 33 Results on Chip 6 Before Masking



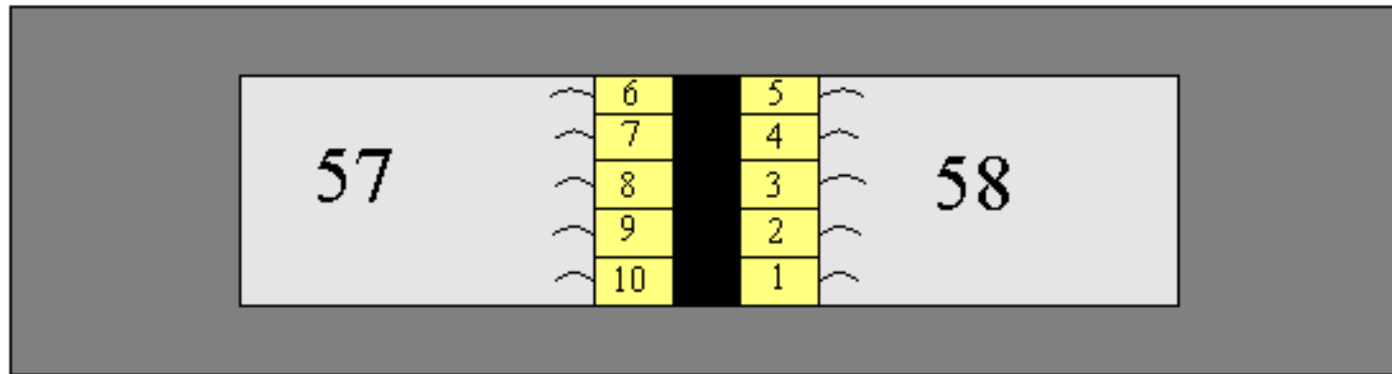
Sensor 33 Results on Chip 6 After Masking



Sensor 33 Results on Chip 7

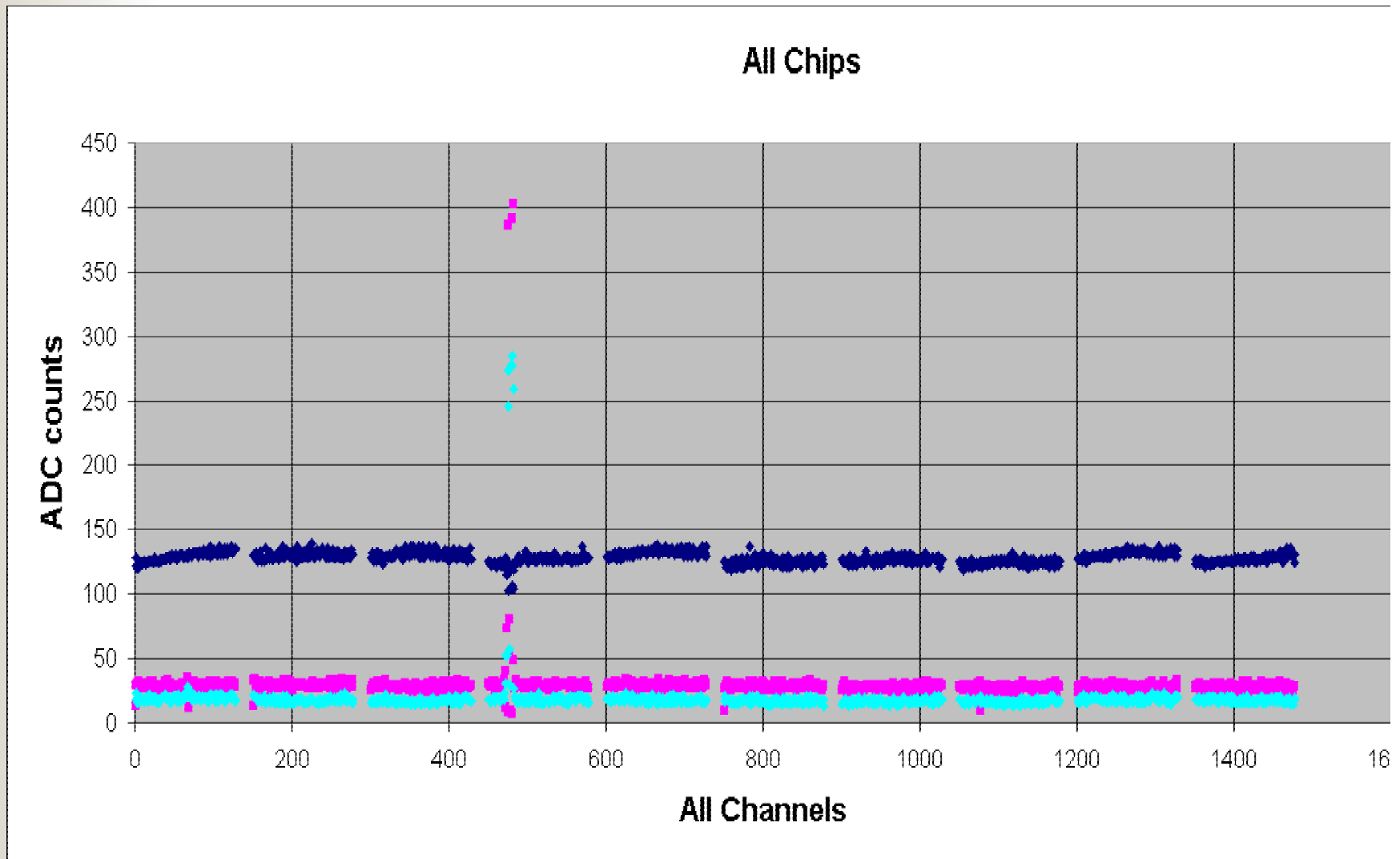


Sensors 57 and 58

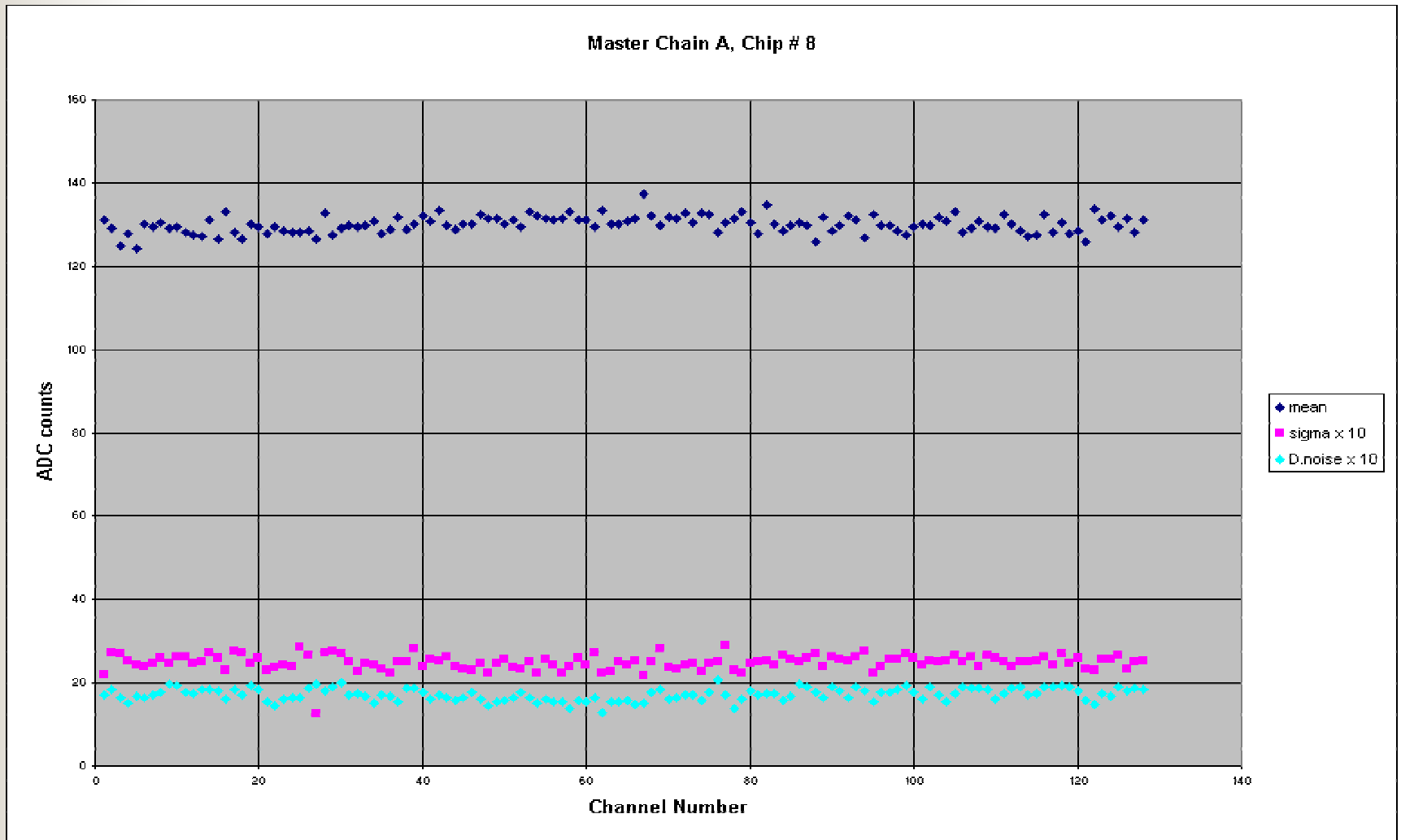


- Not connected channel discovered in sensor 57
 - No pinholes previously detected
- Two not connected channels detected in sensor 58
 - No pinholes previously detected

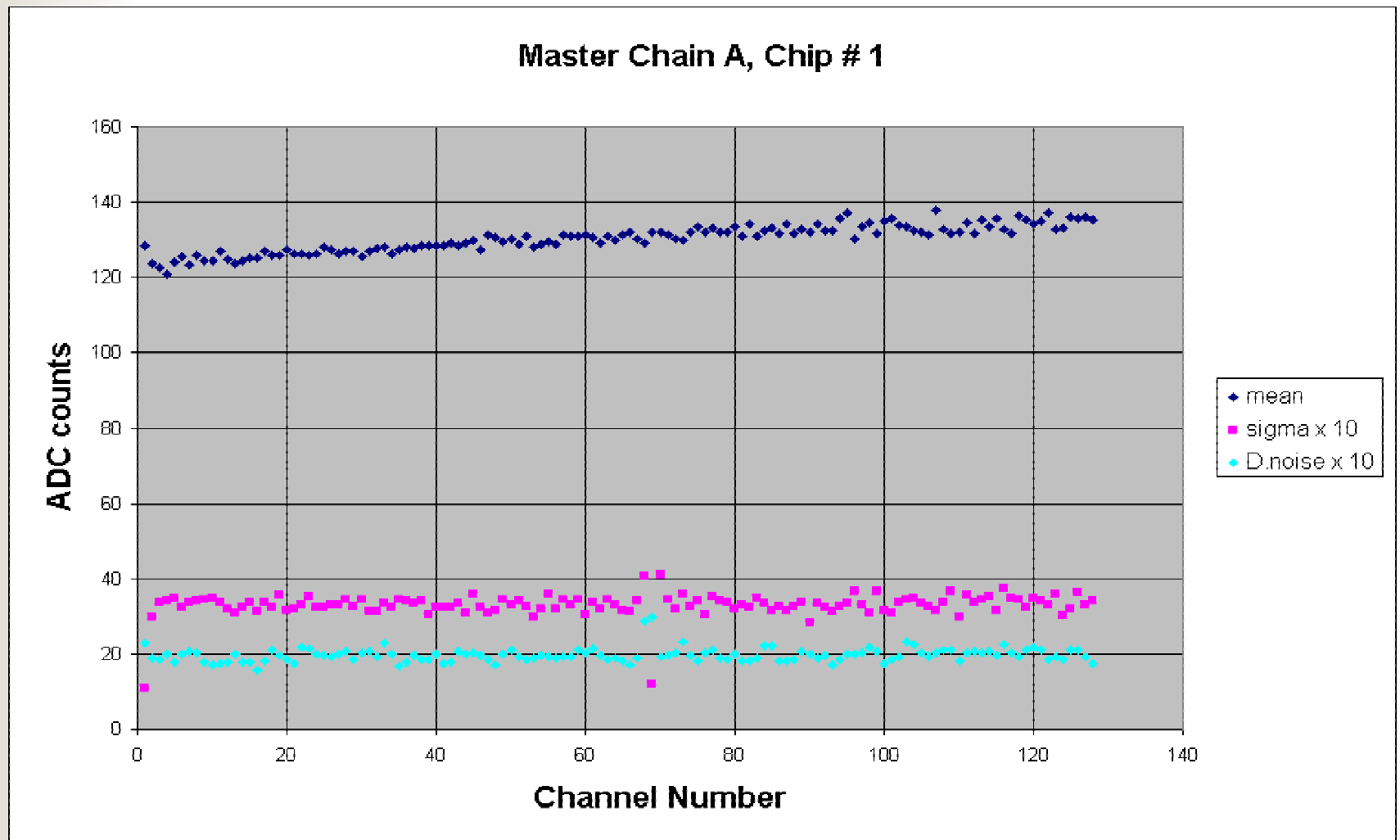
10x10 Stereo Module Results



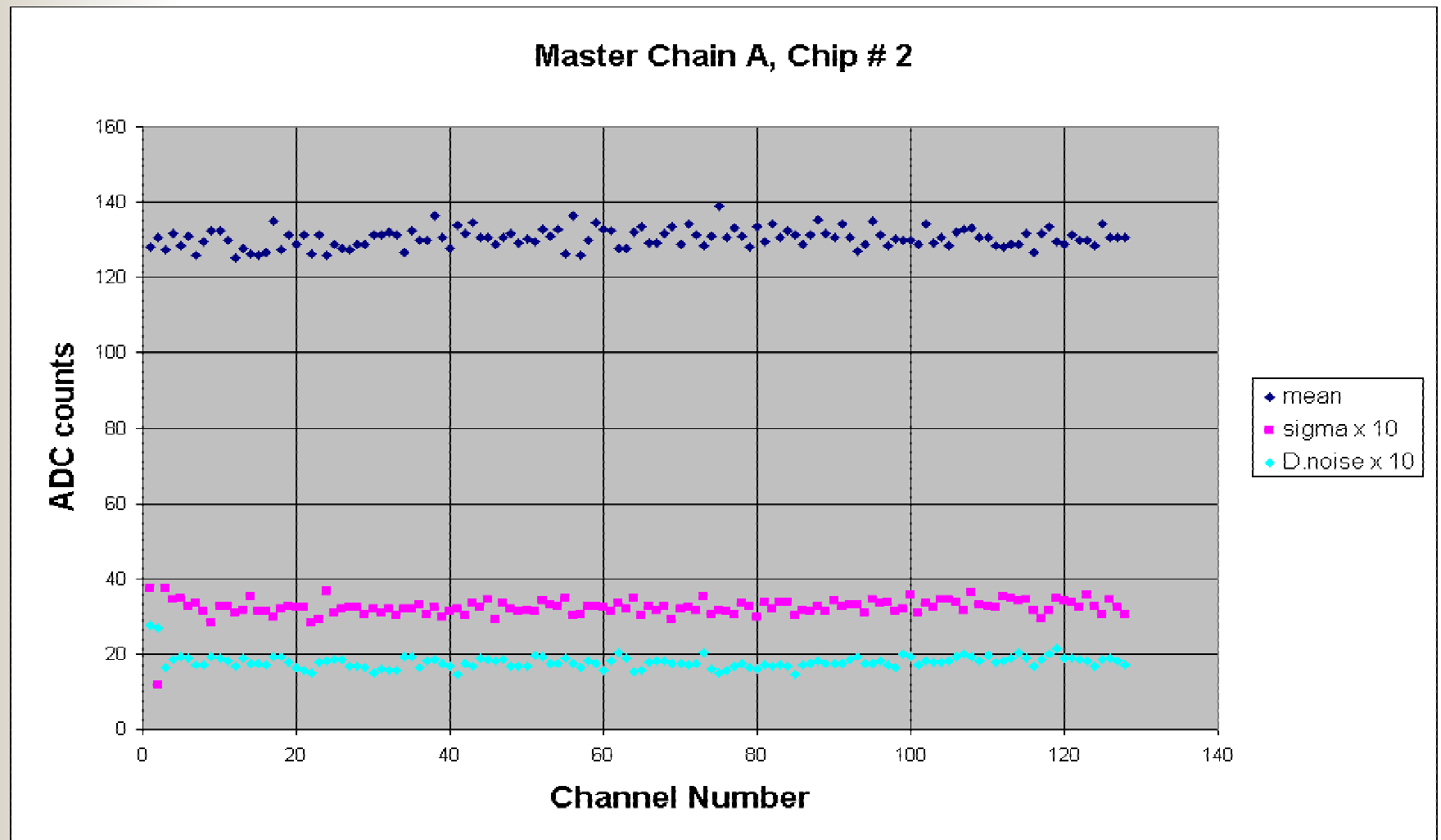
Sensor 57 Results on Chip 8



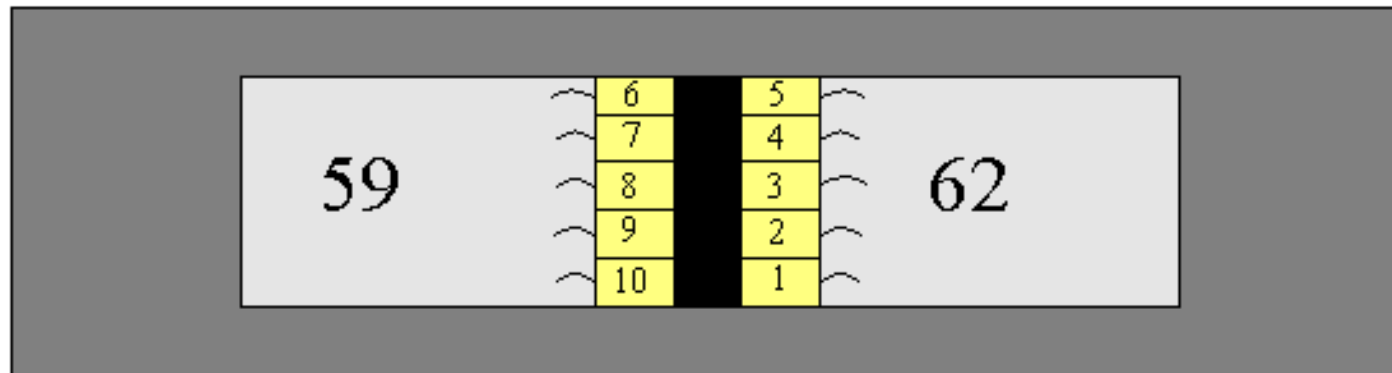
Sensor 58 Results on Chip 1



Sensor 58 Results on Chip 2

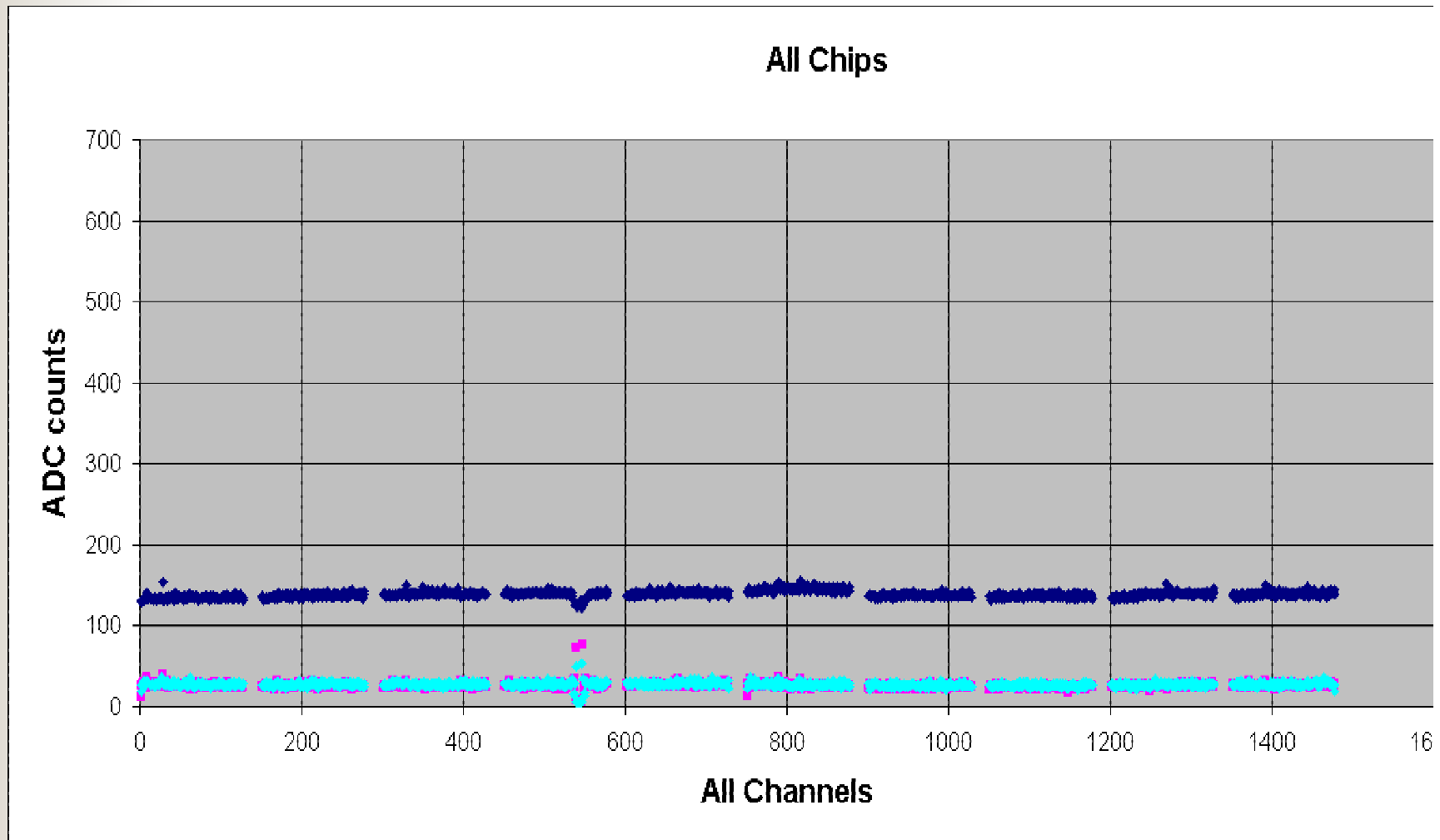


Sensors 59 and 62

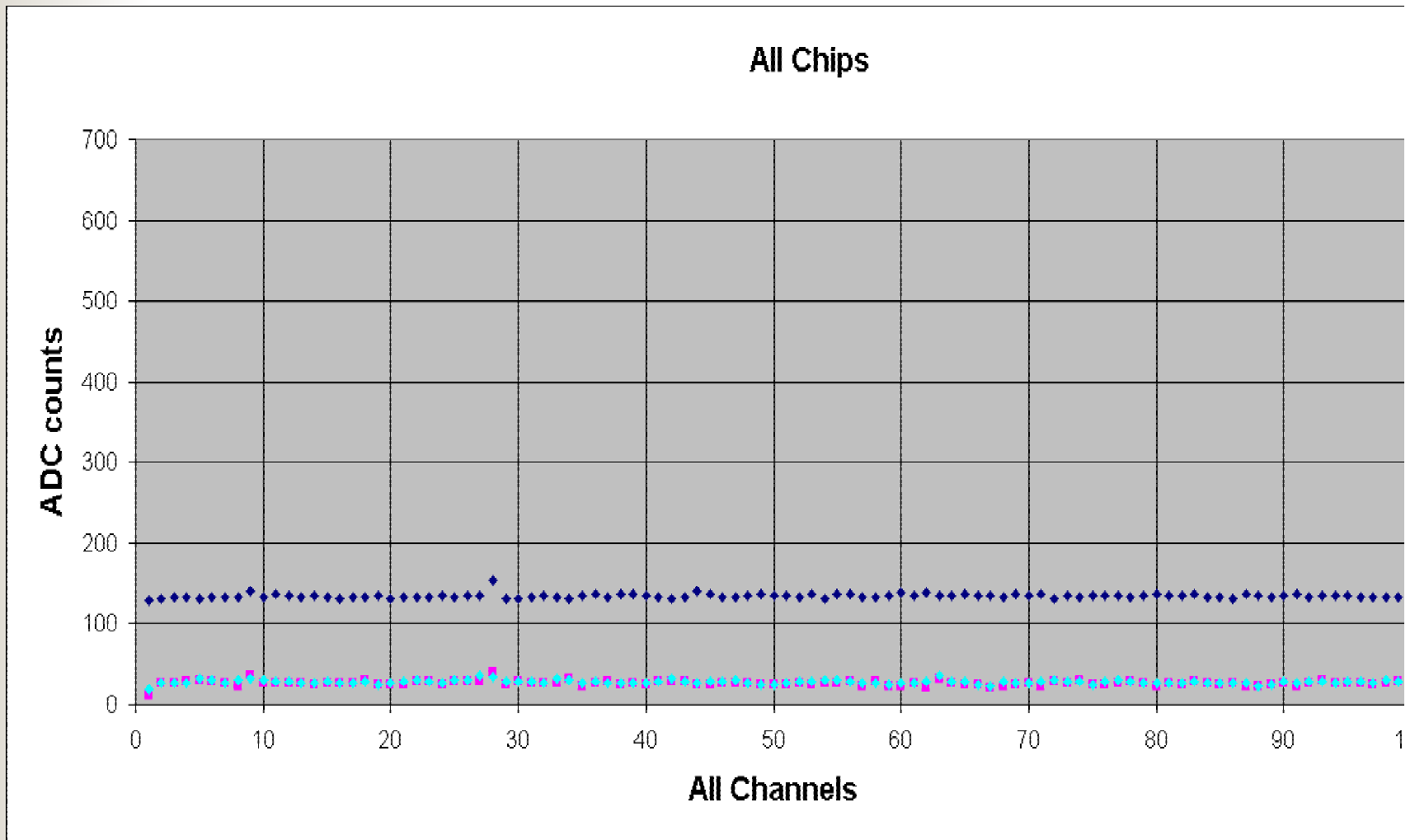


- Did not find same pinhole in 59
 - Pinhole on strip 40 was not found
 - Channel 28 has higher noise & pedestal
- 62 in compliance with previous tests
 - No pinholes detected

10x10 Axial Irradiated Module Results



Sensor 59 Results on Chip 1

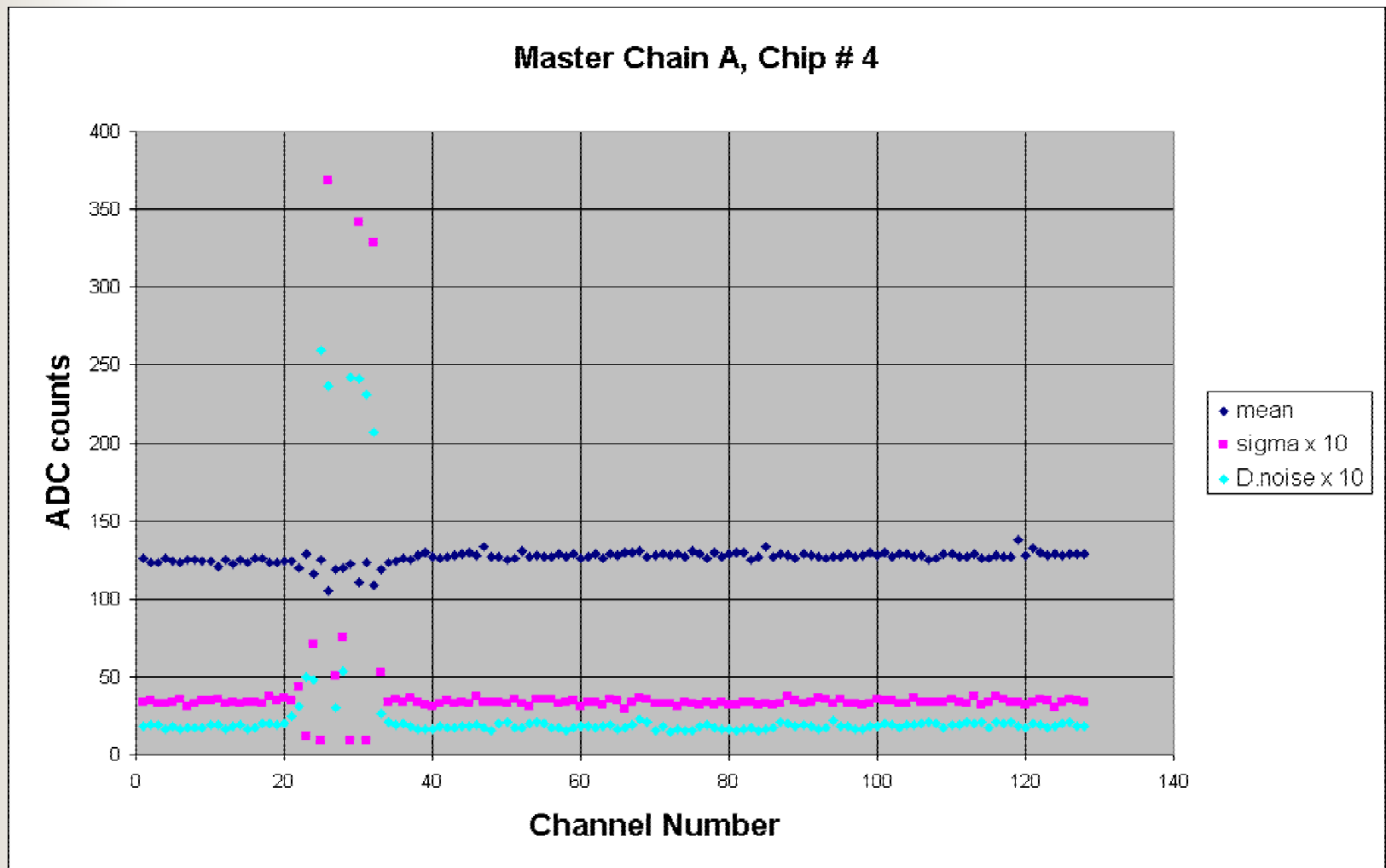




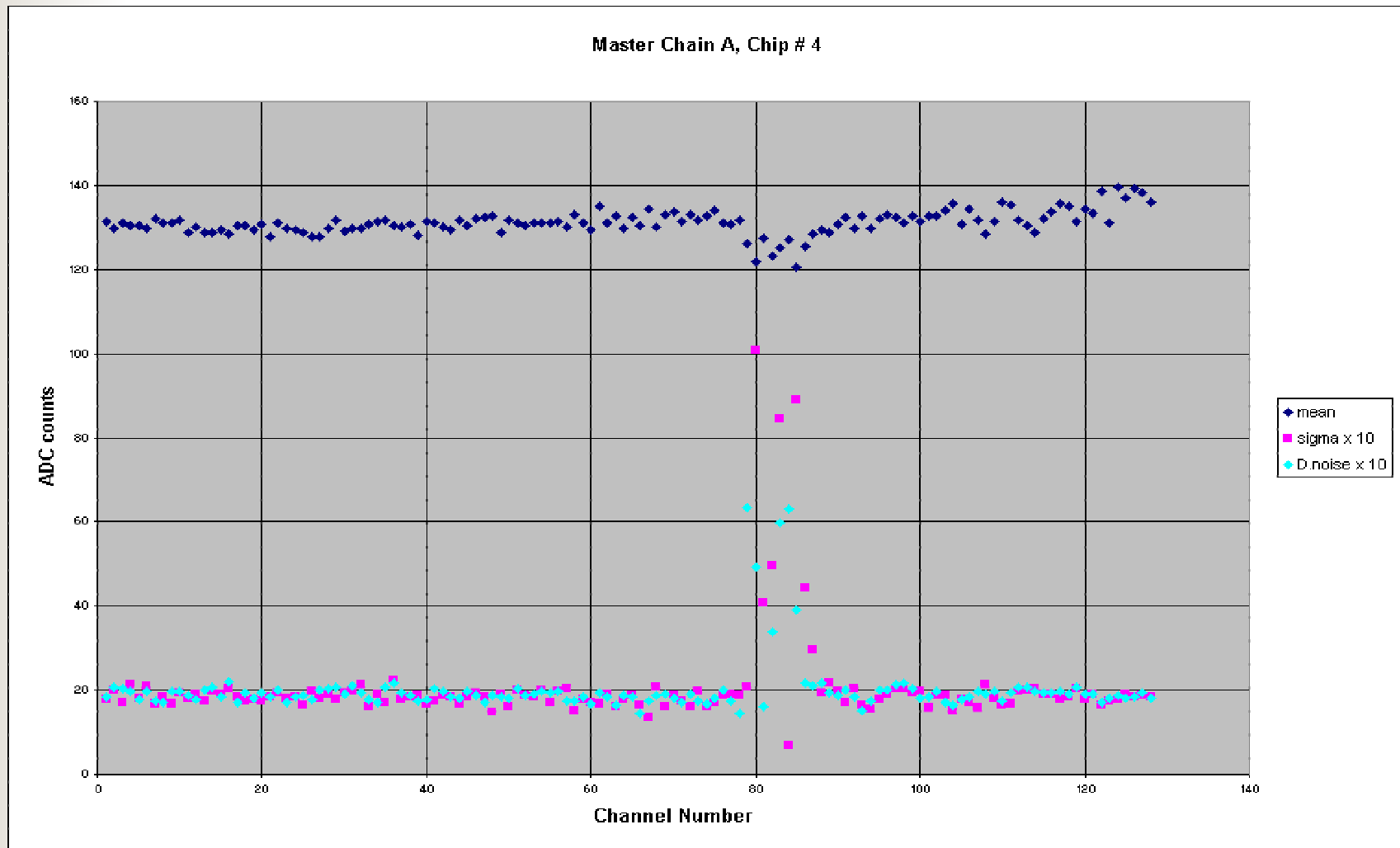
New Developments

- Possible chip malfunction
 - Source of noise could not be masked
 - Which chip?
 - Chip 4
 - Which modules are affected?
 - All tested 10x10 modules
 - Are the malfunctions consistent?
 - Malfunction observed between channels 20 and 40 on stereo module
 - Malfunction observed between channels 80-100 on multiple axial modules
- Possible noise pick-up from cable (needs to be checked)

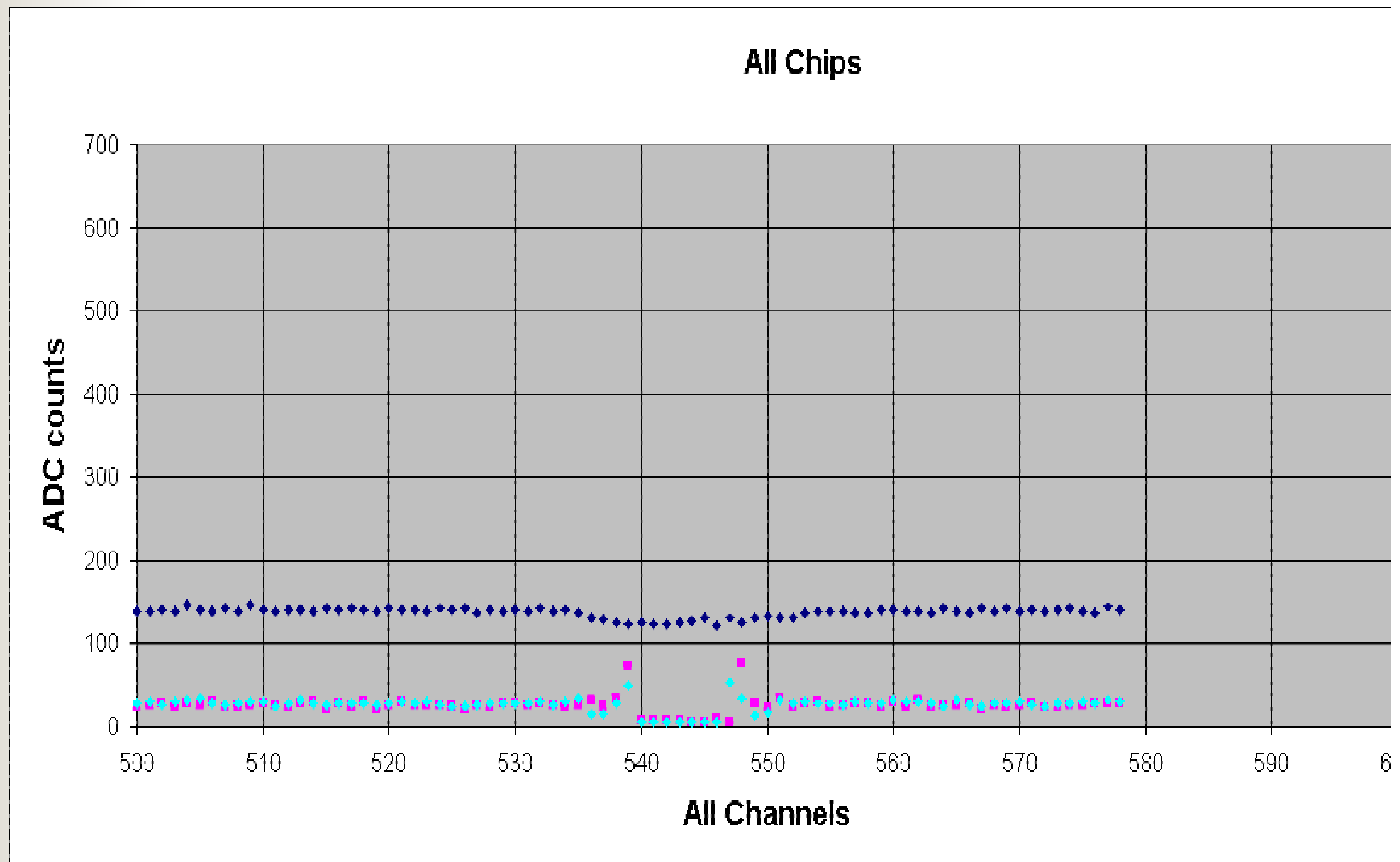
10x10 Stereo Module (Hybrid #1)



10x10 Axial Module (Hybrid L2A #103)



10x10 Axial Module (Irradiated)



Conclusion

- Previous results could not be duplicated
 - Old pinholes were not found and new pinholes were discovered
 - Due to incomplete bonding, some pinholes could not be substantiated
- Possible chip malfunction
 - Chip 4 on 10x10 modules shows suspicious behavior that is unlikely caused by pinholes

